

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

F.R. KELLY & CO.
Attn. Boyce, Conor
27 Clyde Road
Ballsbridge
Dublin 4
IRLANDE

RECEIVED

28 AUG 2008

Computer Diaried
DATE:

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

| | |
|---|---|
| Applicant's or agent's file reference FN153-PCT | Date of mailing (day/month/year) 28/08/2008 |
| International application No. PCT/IB2007/003724 | International filing date (day/month/year) 12/06/2007 |
| Applicant FOTONATION VISION LIMITED | |

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders


Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

| | |
|--|--|
| Name and mailing address of the International Searching Authority  European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016 | Authorized officer Karin Exner |
|--|--|

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|--|--|---|
| Applicant's or agent's file reference FN153-PCT | FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below. | |
| International application No. PCT/IB2007/003724 | International filing date (day/month/year) 12/06/2007 | (Earliest) Priority Date (day/month/year) 12/06/2006 |
| Applicant FOTONATION VISION LIMITED | | |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 1
☒ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☐ as selected by this Authority, because this figure better characterizes the invention
 b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2007/003724

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06K9/64 G06K9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| X | STEGMANN M B ET AL: "Multi-band modelling of appearance" IMAGE VISION COMPUT; IMAGE AND VISION COMPUTING JAN 10 2003, vol. 21, no. 1, 10 January 2003 (2003-01-10), pages 61-67, XP009104697 cited in the application the whole document ----- -/-- | 1-44 |



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

19 August 2008

Date of mailing of the international search report

28/08/2008

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Kessler, Cordula

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2007/003724

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|------------------------------|
| A | <p>OHTA Y-I ET AL: "COLOR INFORMATION FOR REGION SEGMENTATION" COMPUTER GRAPHICS AND IMAGE PROCESSING, ACADEMIC PRESS. NEW YORK, US, vol. 13, no. 3, 1 July 1980 (1980-07-01), pages 222-241, XP008026458 cited in the application Section 1 (introduction) Section 2.2 (KL transform) Section 2.3 (feature selection), in particular the first paragraph at page 228 and subsections (1), (2) and (3) at pages 230-233 Section 4 (conclusion) -----</p> | 2,4,7, 20,24, 26,29,43 |
| A | <p>EDWARDS G J ET AL: "Learning to identify and track faces in image sequences" AUTOMATIC FACE AND GESTURE RECOGNITION, 1998. PROCEEDINGS. THIRD IEEE INTERNATIONAL CONFERENCE ON NARA, JAPAN 14-16 APRIL 1998, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC, US, 14 April 1998 (1998-04-14), pages 260-265, XP010277593 ISBN: 978-0-8186-8344-2 the whole document -----</p> | 22,44 |

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IB2007/003724

International filing date (day/month/year)
12.06.2007

Priority date (day/month/year)
12.06.2006

International Patent Classification (IPC) or both national classification and IPC
INV. G06K9/64 G06K9/00

Applicant
FOTONATION VISION LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Kessler, Cordula

Telephone No. +49 89 2399-2582



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2007/003724

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in electronic form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2007/003724

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|-------------|
| Novelty (N) | Yes: Claims | <u>1-44</u> |
| | No: Claims | |
| Inventive step (IS) | Yes: Claims | |
| | No: Claims | <u>1-44</u> |
| Industrial applicability (IA) | Yes: Claims | <u>1-44</u> |
| | No: Claims | |

2. Citations and explanations

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. D1 to D3 are referred to as the documents cited in the International Search Report, according to the sequence in which they are listed there.
2. The application uses the teachings of D1 (cited as paper [13] in its description) to explore different colour models for detecting faces with active appearance models (AAMs). All the teachings pertaining to AAMs as such, or to the concatenation of the feature vectors due to the use of colour bands (or channels), are known from D1 or other AAM-specific documents cited in the application.
3. The only feature of the claims which is novel with respect to the prior art is the statement that the used colour space is interchannel-decorrelated, and in particular the I1I2I3 colour space.
4. The decorrelation of features by means of principal component analysis or Karhunen Loève transform is one of the standard tools in the field of pattern recognition. Its foremost aim is the reduction of the number of features to be taken into account for classification, while at the same time making use of all available information.

For colour features, D2 clearly teaches that the use of a decorrelated colour space improves segmentation results, in particular if only a selection of the most discriminative resulting colour features is used. Segmentation is a step which precedes localisation or detection of objects, and is hence closely related to the subject matter of the present application.

5. The objective problem to be solved in the present application is the improvement of face detection by AAMs in colour images. D1 discloses (page 64, left column, second paragraph) that the use of RGB colour leads to less accurate results than the use of a grey scale image (where the grey is a mixture of RGB which can be derived by PCA: page 63, section 6, below formula (7)).

This alone provides a strong hint for the skilled person that the full information provided in a colour image might render better results when using decorrelated channels.

He would therefore implement such a decorrelation scheme to test the additional discriminative power provided by the further two channels (with respect to the already tested first channel).

Therefore the subject matter of claims 1 and 23 lacks inventive step.

6. Further to that, common general knowledge as represented by D2 also suggests to decorrelate the colour channels. D2 also clearly points out that the (linear) I1I2I3 transform approximates the KL transform for all types of image patches (page 228, first paragraph of section 2.3), and that the main colour information of an image resides in the I1 and I2 channels (page 231 section 2.3(2), pages 239/240, discussion of table 3, in particular the last sentence before section 4).

Therefore the subject matter of the dependent claims defining the I1I2I3 colour space, a linear conversion, one luminance and two chromatic channels, or the use of less than three channels is obvious from D2.

7. Using the same colour space also for texture and the AAM definitions is known from D1 (for texture cf section 3 on multi-band AAMs).
8. The only further definition not mentioned in D1, tracking faces (claims 22 and 44), is notorious as well, and is known for appearance models eg from D3 (cf the title and section 2.2, in particular the reference to "combined appearance models").
9. In summary, although the present application provides a valuable academic contribution by testing various colour spaces for suitability in the context of active appearance models for face detection, it lacks inventive step as defined as a non-obvious solution, going beyond the common general knowledge of the skilled person.